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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/477,101	01/04/2000	LINDEN A. DECARMO	N0003/7030	8713

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EXAMINER

ALI, SYED J

ART UNIT	PAPER NUMBER
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2127

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/477,101

Applicant(s)

DECARMO, LINDEN A.

Examiner

Syed J Ali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. This office action is in response to the amendment filed August 26, 2004. Claims 1-19 are presented for examination.

2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

### ***Claim Rejections - 35 USC § 103***

3. **Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo (USPN 5,692,192) in view of Eilert et al. (USPN 6,393,455) (hereinafter Eilert) in view of Achenson et al. (USPN 6,477,586) (hereinafter Achenson).**

4. As per claim 1, Sudo teaches the invention as claimed, including in a computer system, a method, performed at a manager (col. 7 line 60 - col. 8 line 11), of distributing call flow events among a plurality of processing nodes (col. 3 lines 46-60), the method comprising:

- a. determining a call flow workload level for each of the plurality of processing nodes (col. 7 lines 7-19);
- b. determining that a first of the plurality of processing nodes is inefficiently handling its assigned call flow workload (col. 7 lines 7-19); and
- c. reassigning a call flow event from the call flow event queue associated with the first processing node to the call flow event queue associated with a second of the plurality of processing nodes (col. 7 lines 20-26).

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5. Eilert teaches the invention as claimed, including call flow events are distributed among a plurality of threads (col. 1 lines 13-33), determining a call flow workload level for each of a plurality of threads on a software level (col. 2 lines 17-39), as opposed to the determination of a workload of a processing node taught by Sudo on a hardware level, and the adjustment of resource allocation in response to the determination that a work unit is inefficiently processing its workload (col. 1 lines 13-33). It is noted that the adjustment of control parameters related to shared resources is not a dynamic balancing of call flow events, but rather an effort to reassign resources to improve the performance of work units. This still has the drawback of not allowing a rebalancing of the thread queue's workload once execution has started.

6. Achenson teaches the invention as claimed, including each thread having an associated call flow event queue in which call flow events are queued (col. 4 line 66 – col. 5 line 13).

7. It would have been obvious to one of ordinary skill in the art to combine Sudo, Eilert, and Achenson since the method disclosed by Sudo of allowing rebalancing of workload from a heavily loaded node to a lightly loaded node is concerned with the entire thread of execution, and does not allow the redistribution of events from one thread to another. Achenson and Eilert make up for this deficiency by providing each thread with a work queue, and a method of monitoring the performance of a thread during execution. However, in response to inefficient performance of the thread, a control parameter for accessing shared resources is modified to improve the performance. This has the drawback of potentially degrading the performance of threads from which the shared resources are taken, wherein the problem of work units inefficiently handling their processing load is not solved. Thus, to utilize the workload balancing method of Sudo could be applied by rebalancing the workload of each thread by redistributing

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events from a heavily loaded node (or thread) to a lightly loaded node (or thread), for instance by the message passing mechanism of Achenson, further improving the performance of each thread.

8. As per claim 2, Achenson teaches the invention as claimed, including the method according to claim 1 further comprising the step:

d. processing the call flow events associated with each of the plurality of threads (col. 5 lines 36-47).

9. As per claim 3, Sudo teaches the invention as claimed, including the method according to claim 1 wherein step c. further comprises:

c1. removing a call flow event from the call flow event queue associated within the first thread (col. 5 lines 10-22); and

c2. placing the removed call flow event in the call flow event queue associated with the second thread (col. 5 lines 10-22).

10. It is noted that the reassigning is not specifically related to call flow event queues. However, this deficiency is made up for in the disclosures of Eilert and Achenson, as discussed above in paragraph 7. Hereinafter, the reallocation of threads disclosed in Sudo will be considered applicable to reallocation of events among queues as well, as discussed in reference to claim 1.

11. As per claim 4, Sudo teaches the invention as claimed, including the method according to claim 1 wherein step c. further comprises:

- c1. selecting the second thread in accordance with the number of call flow events in the call flow event queue associated with the second thread (col. 5 lines 10-22).
- 12. As per claim 5, Sudo teaches the invention as claimed, including the method according to claim 1 wherein step c further comprises:
  - c1. allocating the call flow events to a thread within the computer system with the least call flow load (Fig. 6, col. 5 lines 10-22).
- 13. As per claim 6, Eilert teaches the invention as claimed, including the method according to claim 1 wherein step b further comprises:
  - b1. determining whether the number of call flow events in the call flow event queue associated with a thread has exceeded a predetermined criteria (col. 4 lines 39-46).
- 14. As per claim 7, Eilert teaches the invention as claimed, including the method according to claim 1, wherein step a comprises:
  - a1. assigning call flow events among the call flow queues associated with the respective plurality of threads in the system (col. 1 lines 13-33).
- 15. As per claim 17, Sudo teaches the invention as claimed, including the method according to claim 1, further comprising:
  - d. determining whether a call flow balance has been achieved among the plurality of threads (col. 5 lines 10-22).

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16. Achenson teaches the invention as claimed, including:
  - e. processing the call flow events associated with each of the plurality of threads (col. 5 lines 36-47).
17. As per claims 8-14 and 18, Sudo teaches the invention as claimed, including a computer program product having a computer usable medium having program code embodied in the medium, operable to perform the method of claims 1-7 and 17, respectively (Figs. 1, 2).
18. As per claims 15-16 and 19, Eilert teaches the invention as claimed, including an apparatus adapted to perform the method of claims 1-7 and 17, respectively (Fig. 1).

#### ***Response to Arguments***

19. Applicant's arguments filed August 26, 2004 have been fully considered but they are not persuasive.
20. Applicant argues that the references do not teach "reassigning a call flow event from the call flow event queue associated with the first thread to the call flow event queue associated with a second of the plurality of threads." In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The load balancing mechanism of Sudo is specifically related to redistribution of threads of execution from one node to another. While this does not involve call flow event queues, Achenson and Eilert are cited to demonstrate how load-balancing mechanisms may be used for thread queues as well as processing nodes. It is well known that processing bottlenecks occur, especially in the realm of multithreading. For instance, if a thread is spinning on a shared resource, it may be prevented from executing for a long period of time. If a queue of events is associated with a thread, a bottleneck may be developed within the spinning thread while other threads are able to continue executing and experience very few delays. This situation could be analogized with a heavily loaded node and a lightly loaded node. The heavily loaded node should off-load its processing load to improve the bottleneck and increase the efficiency of processing. The data structures and message passing mechanisms taught by Achenson allow load balancing between threads, while Sudo sets forth the reasons why a processing load should be evenly distributed.

### *Conclusion*

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37



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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali  
November 17, 2004



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